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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,848	08/27/2001	Guy T. Blalock	3578 . 1US (92-555.1)	3166
24247	7590	10/04/2005	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			PATEL, ASHOK	
			ART UNIT	PAPER NUMBER
			2879	

DATE MAILED: 10/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/939,848

Applicant(s)

BLALOCK ET AL.

Examiner

Ashok Patel

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-23, 25 and 26 is/are rejected.
- 7) ☒ Claim(s) 16 and 24 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

Art Unit: 2879

1. Applicant's arguments filed 06/22/2005 have been fully considered but they are not persuasive.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5-9, 11-14, 17 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by MacDonald et al (USPN, 5,844,251, of record).

Regarding claim 1, MacDonald discloses a field emission tip comprising at least a semiconductive material and a conductive material (column 4, lines 50-53). The structure includes a central region including a periphery with a vertical sidewall portion (Figure 3h, element 72), a tapered portion surrounding the central region and including an inclined surface (84) extending toward an exposed end of the central region and an apex (76) at the exposed end of the central region.

Regarding claim 2, the height of vertical sidewall exceeds a width of the central region (column 3, line 18., column 6, lines 1-2).

Regarding claim 3, the apex comprises a low work function material such as a metal silicide (column 7, lines 14).

Regarding claims 5 and 6, MacDonald discloses an apex having a lateral width of less than 100 nm and less than 50 nm (column 6, lines 1-2).

Regarding claims 7, MacDonald discloses a field emission tip including at least a semiconductive material and a conductive material (column 4, lines 50-53). The structure includes a central region including a periphery with a vertical sidewall portion (Figure 3h, element 72), a tapered portion surrounding the central region and including an inclined surface (84) extending toward an exposed end of the central region and an apex (76) at the exposed end of the central region, wherein the apex has a lateral width of less than 100 nm (column 6, lines 1-2).

Regarding claims 8, MacDonald discloses an apex having a lateral width of less than 50 nm (column 6, lines 1-2).

Regarding claim 9, the apex comprises a low work function material such as a metal silicide (column 7, lines 14).

Regarding claim 11, MacDonald discloses a field emission array comprising a substrate (50), at least one pointed tip protruding from the substrate, the at least one pointed tip comprising at least one of a semiconductive material and a

Art Unit: 2879

conductive material (column 4, lines 50-53). The tip includes a periphery, a first portion (Figure 3h, element 72) of which is oriented perpendicularly relative to the substrate and a second portion (76) at an end of the tip of the periphery oriented at an angle relative to the substrate to form an apex, and at least one surrounding element (84) including a surface that tapers toward an exposed end of the pointed tip and that surrounds at least a portion of the pointed tip.

Regarding claim 12, at least the first portion of the periphery is adjacent the substrate.

Regarding claim 13, a height of the first portion of the periphery relative to the substrate exceeds a width of the pointed tip (column 3, line 18., column 6, lines 1-2).

Regarding claim 14, a top portion of the pointed tip comprises a low work function material such as a metal silicide (column 7, lines 14).

Regarding claims 17 and 18, MacDonald discloses an apex having a lateral width of less than 100 nm and less than 50 nm (column 6, lines 1-2).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2879

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 19-22, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald et al. (5,844,251) in view of Jones et al. (5,647,785, of record).

Regarding claim 19, MacDonald discloses a field emitter comprised of a substrate (50), at least one pointed tip protruding from the substrate, the at least one pointed tip comprising at least one of a semiconductive material and a conductive material (column 4, lines 50-53). The tip includes a periphery, a first portion (Figure 3h, element 72) of which is oriented perpendicularly relative to the substrate and a second portion (76) of the periphery oriented at an angle relative to the substrate, and at least one surrounding element (84) including a surface that tapers toward an exposed end of the pointed tip and that surrounds at least a portion of the pointed

Art Unit: 2879

tip. MacDonald fails to exemplify the field emitter in a field emission display.

Jones teaches a field emission display comprising field emitters with similar structure to MacDonald's and teaches the use of such field emitters in display devices to be common, widespread and advantageous (column 1). Jones teaches a field emission display having an anode display screen (column 10, lines 10-13), a cathode spaced apart from the anode display screen, the cathode including a substrate (Figure 8, elements 11 and 17): a gate through which the tip is exposed (46 and 47), a substantial vacuum formed between the anode display screen and the cathode (column 9, line 27), and a voltage source associated with the display screen, the gate and the cathode to provide a potential difference between the cathode and the gate and between the cathode and the anode display screen (column 1, line 35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission tip of MacDonald for use in a field emission display having the structure taught by Jones in order to provide a display device with reduced voltage requirements.

Regarding claim 20, MacDonald teaches a first portion (72) of the periphery of the pointed tip being adjacent to the substrate.

Art Unit: 2879

Regarding claim 21, a height of the first portion of the periphery relative to the substrate exceeds a width of the pointed tip (column 3, line 18', column 6, lines 1-2).

Regarding claim 22, a top portion of the pointed tip comprises a low work ϕ function material such as a metal silicide (column 7, lines 14).

Regarding claims 25 and 26, MacDonald discloses an apex having a lateral width of less than 100 nm and less than 50 nm (column 6, lines 1-2).

6. Claims 4, 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald et al (5,844,251) in view of Yeh et al. (5,897,371), both of record.

MacDonald discloses a field emission tip and a field emission array having all the limitations of claims 3, 9 and 14, as discussed above, including a coating of a low work function material such as a metal silicide.

MacDonald fails to exemplify the types of metal silicides that may be used. Yeh teaches combinations of metal silicides such as aluminum silicide and titanium silicide in use with silicon for use as conductive structures.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the

Art Unit: 2879

metal silicide coating of the field emission tip of MacDonald to comprise aluminum and titanium silicides (aluminum titanium silicide), as Yeh has taught such a combination to be compatible with silicon in forming a conductive structure.

7. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald et al. (5,844,251) in view of Jones et al. (5,647,785) (of record), as applied to claim 22 above, and further in view of Yeh et al. (5,897,371), all of record.

MacDonald discloses a field emission tip having the limitations discussed above, including a coating of a low work function material such as a metal silicide. MacDonald fails to exemplify the field emitter in a field emission display.

Jones teaches a field emission display comprising field emitters with similar structure to MacDonald's and teaches the use of such field emitters in display devices to be common, widespread and advantageous (column 1).

Both MacDonald and Jones fail to exemplify the types of metal silicides that may be used.

Yeh teaches combinations of metal silicides such as aluminum silicide and titanium silicide in use with silicon for use as conductive structures (column 3, lines 30- 50).

Art Unit: 2879

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission tip of MacDonald for use in a field emission display having the structure taught by Jones in order to provide a display device with reduced voltage requirements, and to further modify the metal silicide coating of the field emission tip of MacDonald to comprise aluminum and titanium silicides (aluminum titanium silicide), as Yeh has taught such a combination to be compatible with silicon in forming a conductive structure.

8. Claims 16 and 24 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Reasons are set forth in the last office action (paper no. 0205).

9. The Examiner responds to applicant's arguments as follows.

Applicant argues that the MacDonald does not expressly or inherently describe that the TiW layer 84 comprises or includes a tapered portion surrounding the bottom portion 72 of the emitter tip, or that the TiW layer 84 extends toward the point

Art Unit: 2879

at the end of the tip, ms would be required to anticipate each and every element of independent claim under 35 U.S.C. 102(b).

This is not found persuasive. As shown in Figure 3, MacDonald et al clearly shows TiW layer 84 tapered surrounding the bottom portion 72 of the emitter tip, or that the TiW layer 84 does extend toward the point at the end of the tip, as required to anticipate each and every element of independent claim under 35 U.S.C. 102(b).

Since applicant argues the same point with respect to independent claims 7, 11 and 19, the Examiner applies the same response regarding rejection of independent claims 7, 11 and 19.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

Art Unit: 2879

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ashok Patel whose telephone number is 571-272-2456. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ashok Patel
Primary Examiner
Art Unit 2879